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MIND, METABOLISM, AND MELATONIN : TIME'S ARROW TOWARDS THE FUTURE

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ABSTRACT

Man, like all other organisms, is a product of evolution. It was not a dog eat dog process of competition for the survival of the fittest, as is generally believed. It was accomplished to a large extent through mutual cooperation and peaceful coexistence among species. Human mind is man's greatest acquisition that separates him from animals. The unfolding of the human mind is traced from the beginning of Hinduism and its insights on evolution and biodiversity as a way of life, and also of Buddhism as a morally and ecologically sound philosophy emphasizing the power of mind over body. The scientific basis of the practice of meditation and yoga in the control of mind over body is discussed in light of the Buddhist concept of the "third eye" and the role of the hypometabolic hormone, melatonin, the body's regulator of regulators. The role of meditation and yoga and the possible role of melatonin in the newly developing area of "mind-body medicine" is explored. In these times of greed without restraint, might without wisdom, action without thought and arrogance combined with might, the moral trail left by Buddha, Confucius, Lao-Tse and Christ among others, is more relevant and crucial for human survival and *joie de vivre* today than during their times.

Keywords : Evolution, ancient civilizations, Hinduism, Buddhism, meditation and yoga, melatonin and hypometabolism, mind-body medicine.

INTRODUCTION

Among the thousands of species this planet supports, just a microscopic minority of them compete and kill for space and food. Out of this minority, *Homo sapiens*, the human species, is one that aggressively competes and kills not only for food and space but also to gain control of natural resources in order to develop massive economic and industrial empires supported by military

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power with more and more efficient killing machines, so that those who possess such capability could have total dominance over others who do not. Perverse technology, the prodigal offspring of science, represents the enactment of Mary Shelley's Frankenstein monster, the creation of Baron Frankenstein, the scientist. In an age of science, what was needed was a scientific theory to support and justify such human actions. Support and justification became readily available from Darwin's theory of evolution, of "Natural Selection" and "Survival of the Fittest", a scenario pictured by Tennyson as "red in tooth and claw". On the other hand, the overwhelming majority of species that inhabit this planet and viewed from the human angle, as endowed with little if any intelligence and lacking consciousness, do not kill for space and food but invariably try to avoid a fight. This is a scenario that may be characterized as peaceful coexistence as distinguished from ruthless competition and struggle for existence leading to the survival of the fittest. Within the human species, there is dominance of the male sex over the female. The male derives the power of dominance by virtue of having predominantly higher levels of the killer hormone, testosterone, over his counterpart who has instead, a predominantly higher level of the passive hormone, estrogen. This sexual selection finds divine support from the invention of a male God. Also, according to the Bible, Eve was created as an after-thought from a rib taken from Adam whom God created in his own image. The inferior status of women was established right there.

It has taken well over a century to seriously question Darwin's theory of evolution, which has now become more of an ideology than a mere theory. Behe (1996) has challenged the validity of Darwinism as a scientific theory because of its failure to explain the biochemical origin of life at the molecular level. Milton (1992) has offered compelling arguments to suggest that Darwinism has become a matter of popular acceptance without subjecting it to rigorous scientific scrutiny and debate. Based on studies on human instinct, Ridley (1996) has convincingly argued that the course of evolutionary history was far from a process of ruthless competition but, on the contrary, had a long history of cooperation. Like all forms of life, *Homo sapiens* is a product of evolution and it is only to be expected that, like other species, the human species too must have had a long history of cooperation and social awareness and responsibility to have come to its present stage of supremacy in nature. But, why did it take so long to question the validity of Darwin's theory? The theory could condone if not justify slave trade and other atrocities committed by Europe on the rest of mankind. Commenting on Mahatma Gandhi, Einstein (1950) wrote in 1939, "---- a man who has confronted the brutality of Europe with the dignity of the simple human being, and thus at all times risen superior". Ironically, Darwin's work "The Origin of Species" was published in 1859, two years after the so-called Indian mutiny of 1857 was ruthlessly suppressed and followed by a long reign of terror. Rudyard Kipling citing God's blessings had said, "The responsibility for governing India has been placed by the inscrutable design of providence upon the shoulders of the British race". Winston Churchill had made a candid declaration in the House of Commons in 1931, "The loss of India would be final and fatal to us. It could not fail to be part of a process that would reduce us to the scale of a minor power" (Collins and Lapierre, 1975).

It is a futile exercise to point finger and dwell on past and present wrongs because the human species is one unique species and no single race is totally free from blemishes in behavior. The time has now come for retrospection and to ponder over the circumstances and causes as to how, we as a species, have come to where we are and what the future holds for us, especially

because we have the capability to modulate our destiny and at the same time the power to exterminate most forms of life including our own on this planet.

Dobzhansky (1958) pointed out that in natural selection, what is promoted is what is immediately useful even though it may have the potential to be ultimately fatal. This implies that extinction is a feature built into the evolutionary process. The danger attached to what is immediately useful is echoed in Carson's (1962) warning, "it is also an era dominated by industry, in which the right to make a dollar at whatever cost is seldom challenged". She also emphasized the futility of our efforts to exterminate insects that are pests in agriculture and others which are vectors of diseases, when she said, "to have risked so much in our efforts to mold nature to our satisfaction and yet to have failed achieving our goal would indeed be the final irony". Potter (1990) has suggested that extinction is a fatal flaw in the evolutionary process and what is of immediate use could ultimately lead to extinction. He cites the example of the giant panda of China which is now under threat of extinction because it had adapted itself to a diet exclusively of bamboo and with the disappearance of the bamboo forests, its only choice is to starve to death. However, he proposes that this flaw in the evolutionary process could be overcome by adopting a judicious program of bioethics. But the question is, who will bell the cat?

Homo sapiens has emerged as the most powerful species on this planet. With all the uncertainties of its future, the human mind is undoubtedly nature's greatest and most remarkable product. It is his mind that is ultimately responsible for man's actions and will influence his destiny. According to Trosko (1984), "we as human cybernetic machines, tend to behave in ways that are usually the result of the immediate or short-term feedback of information that allows us to feel "goodness" or "badness" in our behaviour". The present discourse is an attempt to understand the relationship between mind and body and the control by the former over the "cybernetic machine".

THE MIND

"The brain, that three-pound mass of tissue encased within our skulls, is the physical embodiment of mind" says Restak (1988), the neurologist. We know that the whole is greater than the sum of the parts. The brain is only a part of the whole. Restak goes on to say "Thanks to the mind, we can project ourselves into the future and reexplore the past. We have memory. We can empathize and identify with the feelings and actions of others. We can create works of imagination and art. Mind gives us meaning and direction and the possibility of progress over time. Mind orchestrates the realization of the brain and binds consciousness and unconsciousness together. Mind is the astounding interplay of one hundred billion neurons. And more".

We have records of expressions of the mind in its early beginnings done by the stone-age artists, of ostriches running across the Sahara, preserved on rock for at least 10,000 years and of ducks (pintails) portrayed in great detail on a mural in a 15th century B.C. Egyptian tomb (Peterson, 1964). The pyramids of Egypt, though they represent the great culture, ingenuity and creativity of the human mind, are also the standing monuments of the practice of slavery and of the labor of slaves who were forced to build them. The art of the Cro-magnon man, about 17,000 years old, preserved on a wall of the Lascaw cave in the French Dordogne, presents one of the earliest pictorial records of the expression of the human mind (Restak, 1988). The remains of the stone temples built on pyramids ornamented with sculptures of the Maya civilization that had flourished in an

extensive area of southern Mexico, Guatemala, and Belize from the second millennium B.C. to c. 300 – c. 900 A.D., until the advent of the Spanish invasion, present a grim picture of the end of the minds that had unfolded in the creation of a great civilization. The Maya developed a monumental system of water management with large well-planned reservoirs to collect and hold water during the rainy season for distant distribution during the drier months. This provided water to the ancient Maya City of Tikal in northern Guatemala, a city of pyramidal temples and delicately carved facades, supporting a population estimated to be about 90,000 people. Tikal was one of the six huge city-states in southern Maya lowlands extending from Yucatan peninsula to Guatemala, Belize, and Honduras. Archaeologists and Linguists have opined that Tikal in the ancient Maya tongue meant a place of the water hole. However, the sudden and total collapse of the Maya is shrouded in mystery. Several hypotheses have been put forth (Scarborough and Gallopin, 1991; Scarborough, 1992). Scarborough (1992) has suggested that the Maya perhaps may have reached a situation in which the reservoirs that had freed the people from the vagaries of nature, only bound the fate of the Maya more tightly to their dependence on the reservoirs. This situation is suggestive of Dobzhansky's (1958) idea of being tied down to something of immediate advantage, which may have the potential to be ultimately fatal.

In the Indian subcontinent, there existed a great civilization, known as the Indus Valley civilization, over 5,000 years ago. The culture was Dravidian, pre-Aryan. Though much of the archaeological excavations were centered around Mohenjo-daro and Harappa, there is every reason to believe that this civilization extended further south where people there (including the present author) are of Dravidian origin. Sir John Marshall, one of those mainly involved in the excavations, commented "One thing that stands out clear and unmistakable both at Mohenjodaro and Harappa is that the civilization, hitherto revealed at these two places is not an incipient civilization, but one already age-old and stereotyped on Indian soil, with many millenniums of human endeavour behind it. Thus, India must henceforth be recognized, along with Persia, Mesopotamia, and Egypt, as one of the most important areas where the civilizing processes were initiated and developed". (quoted by Nehru, 1951). The people of the Indus Valley knew the use of cotton and had a high sense of public health in having public and private baths and a closed drainage system. Their craftsmen produced articles for the market indicating the existence of a strong merchant community with a surprising wealth of ornaments of gold, silver, precious stones and faience, of beaten copper and metal vessels (see Nehru, 1951). Observations by the present author during his brief period of tenure at the Department of Anthropology, Government of India, showed that among the domesticated animals, was a horse similar to the Anau horse of Turkistan (George, 1952).

Later excavations at the site of Mehrgarh on the Bolan River, in a region in Baluchistan (now in Pakistan) which lies within the Indus drainage system, uncovered farming settlements that had flourished 3,000 years earlier (Jarrige and Meadow, 1980). These new excavations have taken the dating of settled farming life much farther back to 5000 B.C. In addition, excavations in smaller towns, such as Kalibangan and the coastal site of Lothal in India, have contributed substantially to our knowledge of a civilization that had well planned urban life which seems to be in advance of their contemporaries in Egypt or Mesopotamia (Allchin and Allchin, 1982). A view that civilizations behave as adaptive systems, prone to instability with increasing demands on the labor-intensive productive sector by the minority that controls the

sector, has been put forth. When such instability occurs, it leads to breakdowns of the inter-related processes but not due to senility or decadence (Butzer, 1980).

The Indus Valley civilization which was markedly urban seems to have been on the decline when the Aryans, a nomadic people from Central Asia who had no understanding of the urban complex culture, invaded northwestern India about 1500 B.C. For nearly 2,000 years, 1500 B.C., to 500 A.D., was a period which may be considered the beginning of Indian history. The Aryans had brought with them their scriptures and gods. Their main sources of knowledge and culture were the four *Vedas*, the oldest being the *Rig Veda*. A process of cultural blending that followed, produced thinkers who were capable of generating commentaries and interpretations on vedic hymns leading to philosophical speculations called *Upanishads*, thus laying the foundation for Hinduism originally known as *Vedanta*.

Hinduism basically is not a religion in the sense of other organized religions. It is essentially a way of life. As a way of life it was able to absorb several other races and cultures such as Iranians, Greeks, Parthians, Bactrians, Scythians, Huns, Turks (pre-Islam), early Christians (Christianity was established in India in the first century A.D. before Rome), Jews and Zoroastrians. The word Hindu is derived from Sindhu, the original Indian name for River Indus. The old term for religion was *Arya Dharma* which included all faiths Vedic and non-Vedic (see Nehru, 1951).

Hinduism's strength is its resiliency. According to Lucille Schulberg and the Editors of Time-Life Books (1968), "Hinduism seems to have given the people of India extraordinarily satisfactory answers to questions that have concerned men since they began to think : What is man, what is nature, what is God? Why does man live? How should he best live with himself, with other men, with the mysteries of nature and the cosmos? These are hardly questions that occupy the daily thought of people in any country, but they are questions whose answers help to form the culture of the country and affect the least sophisticated person in it. India's indigenous answers to questions about the universe and humanity have permitted millions of people to come to terms with existence and to understand each other in a manner that is one of the world's greatest wonders". This is what mind : the seat of consciousness, thought, volition and feeling, is all about. Restak (1988) says, "another gift of mind is hope. As the search for mind continues and we ask ourselves those questions unique to the human species – why are we here? What is the purpose of our lives? – we forge new directions for ourselves and our fellows". In Hinduism we may have a sense of fulfillment. Rajagopalachari (1989), a renowned scholar of Hinduism says, "a knowledge of Hinduism will make Hindus better Hindus, Christians better Christians, Muslims better Muslims and all of us better citizens in a consolidated nation".

HINDUISM AND EVOLUTION

The seeds of the idea of evolution were sown in Indian minds centuries before Darwin. The *avatar*, derived from sanskrit *avatara*, is the manifestation of a deity which appears on earth in bodily form. Vishnu regarded by Hindus as the supreme deity, is believed to have had nine earthly incarnations or *avatars*. *Avatar* means "descent". The earliest of the nine *avatars* was in the form of a fish, followed by a reptile, mammal, half animal and half human, then a diminutive human. This was followed by the great personalities including Rama and Krishna. The tenth *avatar* is yet to come and according to Hindu belief the arrival of the tenth and final *avatar* will come in the form of *Kalkin* on the back of a white horse signifying the coming of the Maitreya Buddha in *Mahayana Buddhism* (Thapar, 1969).

It is interesting that the people of that time had this concept of evolution since fishes were the first vertebrates to evolve and reptiles were the first true land vertebrates. It is also interesting that snakes (*nagas*) are worshipped in India. Ancestor worship has been a very ancient practice in India, particularly in Kerala, the southernmost part of the Indian Peninsula. So also *naga* worship which is undoubtedly a non-Aryan practice (Menon, 1978). Besides the evolutionary aspect of these beliefs, it also shows the blending of the Aryan and Dravidian cultures. As for example, the personality of Krishna Gopala, "Krishna the cowherd", and the princely Krishna of the epic literature (Cross, 1994). This suggests that Krishna was of Dravidian origin. The present author has often wondered why pictures of Krishna always show him in deep blue color whereas his brother Balarama is shown in light. The Dravidians were dark-skinned compared to the light-skinned Aryans.

Skin color was also a factor in the caste system. The indigenous people who were of dark complexion were called *Dasyus* or *Dasas*. The caste system was not purely of Indian origin. It was a feature common to Indo-European peoples to divide society into three classes, in order of precedence: (1) the priestly class (the Brahmins of India, the Flamens of Rome, the Druids of the Celts), (2) the warrior and ruling class (the Kshatriyas of India, also called Rajanyas), and (3) the producers of economic wealth – farmers, merchants and craftsmen (the Vaishyas). It was an import to India by the Aryans and once there the fourth class of indigenous people (Dasas or Shudras) was added (Cross, 1994).

The concept of *avatars* in Hinduism reflects man's earliest knowledge of evolution. That the first *avatar* was a fish is suggestive of the knowledge that life began in water and that fish was the first true vertebrate. The next *avatar* was a reptile, the first true land vertebrate. Then came the mammal. Hinduism recognizes gods as well as goddesses, thereby indicating that both sexes do have equal status. Besides animals, tree worship is also common. Worship of plants and animals signals the importance of biodiversity. In recent years, there has been considerable emphasis on the need to preserve biodiversity as though it is a new discovery of modern scientific thinking. One may ask, why worship trees and cows? This has to be understood in the context of the times when it all started. In those times, to the general masses, making the tree and the cow divine would be more appealing and meaningful than a scientific explanation for their preservation. The cow was crucial in maintaining the village economy and had to be protected and cared for. The present author, while working on the animal remains from the kitchen midden of the Indus Valley civilization, noticed a large collection of cattle bones cut with sharp implements which was indicative of the fact that cattle were being slaughtered and eaten. It should be mentioned here that, until Emperor Ashoka who had embraced Buddhism before his death in 226 B.C. and had also encouraged vegetarianism, *kshathriyas* and Brahmins generally ate meat and also took wines and alcoholic drinks (see Nehru, 1982, p 64). In order to prevent the killing of cattle, the cow and bull were given the status of being holy. Similarly to prevent deforestation, tree worship came into vogue. The role of man in the fate of the Mauritius dodo (*Raphus ocullatus*), a flightless bird, which was hunted to extinction, is all too familiar. The giant flightless waterfowl, "moa-nalos" (*Ptaiochen pau*) of the Hawaiian Islands became extinct 1,500 years ago (Burney, 1993). The American passenger pigeon that once clouded the skies in their millions became extinct in 1914 (Peterson, 1964). By the hand of man some 78 species of birds have already become extinct (Peterson, 1964).

The caste system in Hinduism has been criticized *ad nauseam*, and justifiably so. The caste

system was introduced as a mechanism for the division of labor. It also brought social stability in the sense that each caste performed their traditional duties without bringing about shortages in manpower in any of the sectors. But human nature as it has always been and will ever be, considers some work superior and others, inferior. With the arrival of the Aryans, the darker skinned indigenous people became untouchables. The racial segregation in South Africa and America has been in existence in modern times. Bennett (1970) wrote, "there has never been a free people, a free country, a real democracy on the face of this earth. In a city of some 300,000 slaves and 90,000 so-called free men, Plato sat down and praised freedom in exquisitely elegant phrases. In a colony of 500,000 slaves and thousands of white indentured servants, Thomas Jefferson, a wealthy slave owner, sat down and wrote the memorable words of the Declaration of Independence. In a country of 10 million second-class citizens and millions on millions of poverty-stricken whites, Woodrow Wilson segregated the toilets in Washington, D.C. and went forth to make the world safe for democracy". The Brahmins who formed the highest caste, by virtue of their position as custodians of the knowledge of the *Vedas* asserted their superiority over the other three castes. Snow (1959) in "*The Two Cultures*" brought out the contrasting attitudes of scientists and the humanists. We know within scientists themselves there are subcultures. Physicists generally consider themselves superior to biologists. Among biologists, some zoologists think they are superior to botanists, and molecular biologists think their science is holier than all the others. On the other hand, greater knowledge should make us all the more humble because there is still so much more to be known and also that the human species is just a microcosm in nature. Furthermore, there is increasing realization that all branches of human knowledge are leading towards convergence, the unity of knowledge (Lumsden and Wilson, 1981; Wilson, 1998).

BUDDHISM: THE UNFOLDING OF THE EVOLVING MIND

Since the time of the ancient scriptures, the Vedas, there appeared the *Upanishads* around 800 B.C. in India. There was the yearning to overcome the finite existence in order to reach the infinite. A popular prayer in the *Upanishads* reads :

"From the unreal lead me to the real;
From darkness lead me to light;
From death lead me to deathlessness.
(see Burtt, 1955).

There arose on the Indian horizon a spectacularly bright star, Siddartha Gautama (Gotama), the Buddha, whom Arnold (1891) described in "The Light of Asia".

Buddha emerged as a rebel against the Brahmin-dominated caste system, authority and tradition. However, he had accepted certain concepts of *moksha*, (ultimate release or liberation), *samsara* (ocean of birth and death) and *karma* (causality in moral experience). In the words of Burtt (1955) "The fact that Buddha accepted so much but not more of religious, philosophical and psychological framework of thought that was being developed in the *Upanishads* at the time he lived indicates both the degree to which his thinking was embedded in the Indian heritage and the degree to which he was ready to criticize that heritage and strike out along radically novel lines". In Buddhism all the emphasis is on the mind and none on circumstances. "Our mind should stand aloof from circumstances and on no account should we allow them to influence the function of our mind" (*The Sutra of Wei Lang* (Hui-neng), cited by Humphreys, 1951).

It is mind that formulates one's destiny and action is only the dictates of the mind. It is, therefore, important to have acquired the right power of concentration and control with an evolved mind, in order to reach the final step of *samma samadhi*, the threshold of *nirvana*, the state of supreme enlightenment. The mind must conquer the various fires of the world, namely, greed, anger, ignorance, infatuation, egoism, decrepitude, sickness and death, fires of sorrow, lamentation, suffering and agony (Kyokai, 1970). Of these, greed, anger and ignorance are the sources of all human woe. In order to rid the sources of woe, one must observe the precepts (Kyokai, 1970). The five precepts are: first, control of the passion of anger; second, the desire for material possessions; the third, the lusts the flesh; the fourth, cowardice and malevolence (the chief causes of untruthfulness); the fifth, the craving for unwholesome excitement (Holmes, "The Creed of Buddha", cited by Humphreys, 1951).

Of these fires, greed is characteristic of the human species, especially of modern man. Human history is full of examples of greed, emassing of wealth and acquiring power to control and dominate over anything. Emperor Ashoka of India was so moved by the slaughter and human suffering in the war of Kalinga that he embraced Buddhism and vowed he would no more indulge in warfare. He also promoted the ideal of *ahimsa*, non-harming of and kindness to all forms of life. Wells is reported to have stated that Ashoka is the only military monarch on record who abandoned warfare after victory (see Nehru, 1982).

Greed is against the wisdom of the body. The energy currency of life, in chemical terms, is adenosine triphosphate (ATP). The body produces ATP as and when needed and that too in the amounts required. The body does not stockpile or hoard ATP. In the recent years we have seen several instances of corporate greed that have led to the swindling of numerous ordinary hardworking people. The exposure of such criminal activities has given rise to antiglobalization agitation throughout the world. Buddhism teaches us to curb desire, which in economics is equivalent to limiting growth. Greed is the outcome of unchecked desire, which in turn leads to exploitation in every sense of fellow beings as well as natural resources.

THE *AJNA CHAKRA*, THE "*THIRD EYE*", AND THE PINEAL

According to the *Vedanta* school of philosophy, *manus* or mind exists in seven different planes or levels known as *chakras* or centers. The topmost head *chakra* (*sahasrara chakra*) is depicted as one thousand petals of the lotus. The remaining six centers are collectively called *shatchakras*. The driving force of life, *prana* or breath, is believed to pervade each part of the body through numerous channels *shiras* or *nadis*. These channels are connected to the *chakras*. Below the *sahasrara chakra*, in between the two eyebrows, is the *ajna chakra* (neural plexus or circle) which is active in the elaboration of thought. Through the various channels, the *ajna chakra* is also connected to the last *chakra*, the *muladhara chakra* which is situated between the genitals and the anus. The primordial energy of the body is visualized as *kundalini shakthi* or serpent power. This energy occurs in two forms, potential and dynamic. The potential form occurs in the *sahasrara chakra* and the dynamic form in the *muladhara chakra*. The serpent lies coiled up and when roused is transformed into the dynamic form (Singh and Chhina, 1974). It is interesting that illustrations showing the *Tantric chakras* in the body, indicate the connection as a double helix similar to that of DNA (see Singh and Chhina, 1974: p 90; Cross, 1994: p. 112).

Ajna chakra is depicted as the "third eye". The "third eye" in Hinduism and Buddhism is

considered as "the eye of insight". God Shiva is believed to have had this eye of insight in the center of the forehead. Suzuki (1970), the world authority on *Zen* Buddhism writes, "Generally, we are blind to the fact that we are in possession of all the necessary faculties to make us happy and loving toward one another. All the struggles we see around us come from ignorance. *Zen*, therefore, wants us to open a "third eye", as Buddhists call it, the hitherto, undreamed-of region shut away from us through our own ignorance".

A primitive photoreceptor or "third eye" did exist in certain extinct species and is present in lower vertebrates. The living reptilian fossil, tuatara (*Sphenodon punctatus*) of New Zealand possesses a relatively prominent "third eye". Its presence in a vestigial form seen in the present day vertebrates, except the hagfish *Myxine*, crocodilians, edentates and probably dugongs, exists as the pineal organ. Richard Eakin of the University of California was the first to reveal the photoreceptive characteristic of this organ, the pineal organ, at the ultrastructural level in the lower vertebrates (see Eakin, 1964). In the human body, the pineal organ, about the size of a pea, occupies a position exactly in the center of the brain. Though it has lost its photoreceptive function as such and become a gland secreting an important hormone, melatonin, it is sensitive to light. The only known role of this hormone at the time when this author was a student, was to lighten the frog's skin when injected. During the last three to four decades, melatonin has acquired phenomenal importance as a hormone that exerts its influence practically on all aspects of the body's physiology, a regulator of regulators.

MOVEMENT, METABOLISM AND MELATONIN

Melatonin (N-acetyl-5-methoxytryptamine) is synthesized in the pineal as a response to darkness or the absence of light input, from its primary precursor, tryptophan, an essential amino acid which has to be supplied from the diet. Tryptophan is converted to serotonin which is then converted to N-acetylserotonin by an enzyme, N-acetyltransferase and finally to melatonin by the enzyme hydroxyindol-O-methyltransferase. During night the circulating levels of melatonin are highest, thus inducing sleep. Reiter has referred to melatonin as "the chemical expression of darkness" (see review, George, 1999a).

Movement is the most visible sign of life. Muscles provide the power for movement and performance of work. In order for muscles to perform efficiently the body has to be adequately warm. Cold-blooded animals such as reptiles bask in sunshine in order to raise their body temperature. Warm-blooded animals like birds and mammals in cold environments shiver and raise their body temperature. Prolonged movement can raise the body temperature and maintain it at an optimal level by releasing the excess heat from the body. Locomotory muscles are generally composed of two types of muscle fibers, one, red in color due to the presence of myoglobin, loaded with lipid in addition to glycogen and with oxidative enzymes, thus adapted for long-term aerobic metabolism utilizing lipid as the main fuel for energy. The other type consists of white fibers due to lack of myoglobin, loaded with glycogen and glycolytic enzymes but no fat, thus adapted for short-term anaerobic activity utilizing carbohydrate as fuel. These fibers do contain moderate amounts of oxidative enzymes for aerobic utilization of carbohydrate. So in shivering thermogenesis, it is the white fibers that are preferably recruited for quick and immediate action.

Melatonin has been shown to reduce body temperature, heart rate, breathing frequency, oxygen consumption but increase dissipation of body heat in order to maintain constant optimal body temperature. It has also been shown that in

prolonged muscular activity there is an increase in circulating levels of melatonin. Melatonin also reduces the activity of the thyroid hormones, thyroxine and triiodothyronine, in order to reduce oxidative metabolism. So the increase in circulating levels of melatonin in marathon runners serves to regulate body temperature and to prevent heat stroke (for review see George, 1999a). Melatonin has also been implicated in the alleviation of "hot flashes" in menopausal women (George, 2001). The circulating levels of melatonin have been found to be significantly increased in women athletes during prolonged vigorous exercise, which renders them vulnerable to irregular menstrual cycles leading to amenorrhea. Amenorrhea commonly occurs in women runners and is called "athletic amenorrhea". This is nature's way of preventing an unsafe pregnancy (see George, 1999a). Melatonin receptors have been located in the "Circle of Willis" of the brain circulation from which cool blood flows to the brain so that heat stroke could be prevented (Viswanathan et al., 1990; for review see George, 1999a).

MIND, MEDITATION, AND MELATONIN

The *muladhara chakra* is the seat of creative desire (*kama*) which leads to procreation. This *chakra* is in communication through the channels (*shiras* or *nadis*) with the *ajna chakra* and the highest *chakra*, the *sahasrara chakra*. If the *ajna chakra* corresponds to the pineal, melatonin would be produced there. It is known that melatonin can regulate and also inhibit the reproductive system in males and females. That high melatonin levels in women athletes could bring about "athletic amenorrhea", has already been mentioned. Analogs of melatonin have been found to inhibit human reproductive system when administered orally. As a matter of fact, Beta-Oval, a preparation containing 75 mg melatonin and 0.3 mg progestogen is already being used as a reliable birth control pill (Reiter and Robinson, 1996; Solkoff et al., 1999). Melatonin has also been found useful in the treatment of premenstrual syndrome (PMS) (Reiter and Robinson, 1996). In 1898, Heubner, a pathologist reported the case of a 6-year old boy who showed precocious sexual maturity as a result of his pineal gland having been destroyed by a tumor (see George, 2000).

Homosexual mounting behavior has been shown in male rats fed a diet containing all amino acids except tryptophan, the primary precursor of serotonin and melatonin. This behavior was prevented by the administration of 5-hydroxytryptophan, the direct serotonin precursor (Fratta et al., 1977). Is there a connection between lack of melatonin and homosexuality? It is also known that diets rich in animal protein and containing high levels of the amino acid, tyrosine, are preferably taken up by the body over tryptophan leading to the production of significantly higher amounts of adrenaline, noradrenaline, and thyroxine. This could lead to more aggressive behavior unlike that associated with a mainly carbohydrate or vegetarian diet where tryptophan has a greater chance over tyrosine of being taken up by the body (Fernstrom and Wurtman, 1974, for review see George, 1999a). You are what you eat! It has been reported that Mahatma Gandhi, a vegetarian, when he was a student in England experimented on himself by switching to a meat diet in order to see whether it would be more beneficial than the vegetarian diet. To his horror he found that he was having greater erotic and aggressive feelings when on a meat diet which he did not want. So the experiment was immediately terminated.

Pineal disorders have been implicated in mental disorders, such as depression, manic depression, and schizophrenia. Melatonin treatment has been found to be beneficial. So also in

managing cases of autism, alcoholism, and seasonal disorders such as mood changes. Suicide victims have been found to have low levels of melatonin in their pineals (see Reiter and Robinson, 1996).

Low melatonin levels have been observed in Alzheimer's patients. Melatonin is a powerful antioxidant and so it can reduce the risk of cancer and also promote oncostasis and enhance longevity. Melatonin protects and strengthens the immune system. Chronic pain sufferers have been found to have low melatonin levels. As a sleep-inducer, it is also useful in insomnia and in overcoming jet-lag (see Reiter and Robinson, 1996; Reiter et al., 2002; Tan et al., 2003; Allegra et al., 2003).

Besides the above, melatonin has been found to be effective in the treatment or prevention of cataracts, AIDS, diabetes, epilepsy, heart diseases, Parkinson's disease, stress and stress related problems, irritable bowel syndrome, childhood colic, gastric ulcers and ulcerative colitis (see Pentney and Bubenik, 1995; Turek, 1996; Arendt, 1997; Bubenik, 2002; Cabeza et al., 2002).

Buddhism consistently opposed the perverse caste system and promoted the freedom of women. Buddhism stressed *karuna*, compassion towards fellowbeings and animals. Above all Buddhism provided hope for improving the quality of life by individual effort and by seeking fulfillment through enlightenment rather than by possession of material things. Buddhism also laid great emphasis on the control of the mind over the body through concentration and meditation, thereby making every individual self-reliant and responsible for all individual actions. Thus Buddhist teachings came in direct conflict with the existing Brahmin-dominated, ritualistic and corrupt system which resulted in Buddhism being banished from the land of its birth.

There has been increasing interest, especially with the new advances in experimental psychology, towards the understanding of mind-body interactions. Better understanding of such interactions should also be of much interest to the newly developing aspect of medical practice "mind-body medicine". In a recent report (2001) in Science News (Vol. 160 (23): p. 362), Yue and his associates at the Cleveland Clinic Foundation (U.S.A.) have shown that when volunteers were asked to just think that they were contracting a finger or bending an elbow without actually doing it, the muscles of the finger or of the elbow concerned, were strengthened by 35% and 13·5% respectively, over a 12 week regimen consisting of 50 mental contractions, 5 days per week. No increase in muscle size was observed which led the investigators to suggest that the change in muscle was caused by the signals from the brain to the muscles. Such information could be of significance in treating stroke victims and also the elderly, and the investigators are presently exploring these possibilities.

In order to make use of such knowledge in medical practice, it would be desirable to have an understanding of the physiology of meditation. In the ancient Indian practice of yoga, elevated states of consciousness are achieved through meditation and mental concentration (*samadhi*) by which a certain level of control of the body is achieved. During transcendental meditation the yogi indulges in breathing exercises (*pranayama*) while seated in the lotus (cross-legged) position. In order to keep the body fit, there are yogic exercises. Perhaps, it is not quite appropriate to call them exercises. They are actually different body postures, *asanas*, which are meant to help maintain the body in proper tone with adequate blood circulation. Some of the *asanas* are also to relax the body. The Chinese system called "Thai Chi" is similar but it includes mild movement, "meditation in slow motion". Even those who are over 80 years of age can do this system. It also improves circulation and respiration. There is a general misconception that yoga consists of physical exercises or *asanas*. Rajagopalachari

(1989) has aptly stated, "the effort and vigilance that secure this control (of mind and senses) is yoga, an oft-repeated but much misunderstood word. Yoga is not a physical exercise in postures, giving unusual powers over the body. It is self control rendered into a habit".

The practice of *yoga* was formulated in *Yoga Sutra* of Patanjali, probably in the third century A.D. (Cross, 1994). It should be mentioned that the grammarian Patanjali who wrote the commentary called "*Mahabhashya*" on Panini's Sanskrit grammar was a different person who lived in the second century B.C. (see Nehru, 1951). The main objective of yoga has been defined as *yogashchittavrittinirodha*, suppression of the fluctuations and disturbances of consciousness and control of breathing *pranayama*.

Interest in the physiology of yoga was first initiated in the West by Therese Brosse, a French cardiologist who went to India in 1935 and monitored cardiac activity in yogis during meditation, using an electrocardiograph (see Wallace and Benson, 1972). She found that her subjects could stop heartbeat. Anand of the All-India Institute of Medical Sciences in collaboration with two American physiologists, Wenger and Bagchi, repeated Brosse's work in 1957 using better equipment and noted that the absence of cardiac activity noted by Brosse was an artifact caused by the equipment she had used. However, they found that their subjects could slow heart beat and respiratory frequency (see, Wallace and Benson, 1972).

Anand et al. (1961) had reported that a *yogi* meditating in an airtight sealed metal box, showed marked reduction in O_2 consumption and CO_2 elimination. Working with *Zen* monks in Japan, Sugi and Akutsu (see Wallace and Benson, 1972) also noticed reduction in O_2 consumption and CO_2 elimination during meditation, thereby indicating significant reduction in metabolism. Wallace (1970) also working with *Zen* monks reported that heart rate was reduced during meditation and skin resistance was increased. Encephalographic recording showed progressive increase in amplitude of alpha waves but decrease in frequency during meditation. It was suggested that meditation reduced the activity of the sympathetic nervous system, resulting in the reduction in norepinephrine levels preventing vasoconstriction and lactate production.

In a study on yogis practicing *Tum-mo yoga*, a Tibetan Buddhist meditation technique, Benson et al. (1982) observed that their subjects showed the capacity to increase the temperature of their fingers and toes by 8·3°C during meditation, a phenomenon attributed to vasodilatation by Jevning (1978) in which a 44% increase in non-hepatic, non-renal blood flow was observed during transcendental meditation (cited by Benson et al., 1982).

The marked increase in skin resistance during meditation is also of considerable interest (Wallace and Benson, 1972). Electroencephalograph recordings had indicated increased activity. These observations led to the conclusion that there were signs of "wakeful hypometabolic" state (Wallace et al., 1971).

In nature hypometabolic states are reached when some animals hibernate during winter months or aestivate during summer. During this state of hypometabolism, body temperature is brought down, so also heart rate, respiratory frequency, and oxygen consumption. Sleep is also an energy saving state. Hibernation and aestivation which are seasonal, and daily nocturnal hypothermia which is nonseasonal, may be considered extensions of the phenomenon of sleep, particularly slow wave sleep (Heller et al., 1978; Walker et al., 1983). In endotherms, the metabolic rate is markedly lower during sleep than during quiet wakefulness mainly due to regulated lowering of the body temperature during slow-wave sleep so also a depression in hypothalamic thermosensitivity

(Heller, 1988). Though in both sleep and hibernation there is decline in body temperature, heart rate, respiratory frequency, oxygen consumption and reaction to stimuli, the extent of reduction in these parameters is quantitatively much larger during hibernation. The two are also different in their central control. Sleep but not hibernation would be suppressed if the anterior hypothalamus were experimentally lesioned. On the other hand, lesion of the posterior hypothalamus would induce deep sleep but would impair entry into hibernation (for review see, Krueger and Shohan, 1986). In the central thermostat, the posterior hypothalamus is the center for heat production and the anterior hypothalamus for heat reduction. In hibernation, the thermostat is not turned off but turned down to be activated as and when necessary.

In light of the similarities and differences between sleep and hibernation, there has been considerable interest in endogenous sleep inducers and hibernation triggers (for reviews see, Borbey and Tobler, 1980, 1989; Krueger and Shohan, 1986). Among the number of substances detected, melatonin is one that is of special interest for the present discourse. It has already been mentioned that melatonin is a sleep-inducing hormone.

During transcendental meditation and sleep, both being hypometabolic states, besides reduced metabolic rate, O_2 consumption and CO_2 production (Wallace and Benson, 1972), there is hypoventilation and elevated end-tidal CO_2 accompanied by periodic breathing episodes of respiratory suspension (Hebert, 1977; Wolkove et al., 1984). Chemosensitivity was also apparent as denoted by the ventilatory response to CO_2 during meditation (Wolkove et al., 1984).

In a study on an Indian yogi practicing *bhoogarbha samadhi*, entering into meditation in a sealed underground chamber, voluntary hypometabolism, Heller et al. (1987), using an open flow system over a 5h period, observed that O_2 consumption was reduced by 40% in a 4h period of meditation. With the commencement of meditation, the core body temperature dropped by 0.4°C but at the end of the meditation period all the above events were reversed. It was reported that at the end of the *samadhi* the yogi routinely felt cold. These observations clearly indicate that the yogi was in a state of hypometabolism. The drop in body temperature was facilitated by vasodilatation and the reason the yogi felt cold was that after the hypometabolic state ended, there was vasoconstriction rendering the extremities cold. In an earlier study by Kothari et al. (1973) on a yogi during an 8-day confinement in a sealed underground pit, the yogi had experienced a 2h-shivering spell on the termination of the *samadhi*. The study by Benson et al. (1982) reported there was an increase in the temperature of the extremities in their subjects during meditation. In a recent study on women who regularly meditated, Massion et al. (1995) found that they had significantly higher melatonin levels than those that did not meditate. Studies with melatonin-implanted pigeons have shown that these birds were in a state of hypometabolism as indicated by decreases in core body temperature, heart rate, breathing frequency and showing a trend towards drop in oxygen consumption, but a significant increase in foot temperature indicating vasodilatation and heat dissipation (George, 1999a). It should be mentioned here that removal of the pineal gland (pinealectomy) caused hyperthermia in pigeons but the hyperthermic effect of pinealectomy was nullified in melatonin-implanted pigeons (George, 1982). In light of the above observations, it is possible to conclude that that during meditation there is increased peripheral blood flow due to the release of melatonin into circulation and that in turn causes vasodilatation and heat dissipation, leading to the drop in body temperature. Melatonin also causes reduction in the other parameters mentioned earlier, thereby establishing a state of hypometabolism.

That meditation could increase circulating levels of melatonin, has been mentioned earlier (Massion et al., 1995). That exercise could increase melatonin levels in the blood has also been demonstrated in humans (Strassman et al., 1989) and in homing pigeons during natural homing flight (John et al., 1993; George, 1999b). Therefore, it seems logical to expect higher circulating levels of melatonin in "Thai Chi" practitioners than those who only meditate. These observations call for investigations on the effects of the various methods of meditations, including "Thai Chi", on circulating levels of melatonin.

MEDITATION, SLEEP AND HYPOMETABOLISM

The type of meditation, known as transcendental meditation, has been popularized especially by the efforts of Yogi (1963). It has had tremendous success in many countries, especially the United States of America. It has been estimated that in the U.S.A. alone there have been over 360,000 initiates between 1968 and 1974. Wallace and associates (Wallace, 1970; Wallace et al., 1971) were the first to provide information on the physiological aspects of meditation. Their work has received severe criticism regarding certain aspects of their methodology and conclusions (see Davidson, 1976). For example, Davidson states, "The lack of nonmeditating control subjects in the most authoritative (and widely publicized) experiments of Wallace was a serious defect and it is still highly questionable whether some or all of the changes noted might not be regularly present in nonmeditating individuals sitting relaxedly with their eyes closed and occasionally napping". Davidson (1976) also indicated that this conclusion could be confirmed by a study on subjects selected for hypnotic suggestibility.

Experimental design in the studies of Wallace has also been the focus of criticism in a controlled study of electroencephalograms (EEG) during transcendental meditation in comparison with hypnosis (Tebecis, 1975). It was observed that the EEG characteristics of the meditators were similar to those of subjects experienced in self-hypnosis. EEG pictures indicate just one aspect of the activity of the brain. The fact of the matter is that the body utilizes all its resources that are necessary to maintain a steady state. We do know that melatonin is a sleep-inducing hormone (Hishikawa et al., 1969). Melatonin levels in the blood are known to be higher in the night than in daytime in a diurnal animal, during meditation, during long homing flights in homing pigeons and also in men running a 28·5- mile mountain race (see George 1999a). Possibly, melatonin levels in the blood should also be higher in subjects under hypnosis. Surely, pigeons and humans in the above situations were not napping as opined by Davidson (1976). There could also be increases in circulating levels of endorphins. Exercise has been shown to elevate plasma levels of β-endorphin in humans (Viswanathan et al., 1987). β-endorphin levels were found to be increased in the 28·5 mile mountain race runners (Strassman et al., 1987). Analgesic action of melatonin has been observed in several studies on mammals (Bar-Or and Brown, 1989; Golombek et al., 1991). It may also be mentioned that pigeons under sodium pentobarbital anesthesia showed higher blood levels of melatonin than normal resting pigeons in the daytime (see George, 1999a, Table 1). The analgesic action of melatonin and endorphins should be of significance in the reduction of pain and other discomforts. It may also create some ecstasy or euphoria in these subjects. These observations are of relevance to the system of acupuncture practiced in China for 2500 years (see Guei-Djen and Needham, 1980). That mind has the capability to influence and even control our physiology and that transcendental meditation is a route that is rewarding, is precisely the message that Yogi wanted to convey.

A common feature in meditation, sleep, and hypnosis is hypometabolism. Melatonin has been shown to be involved in hibernation (Lynch et al., 1978a), sleep (Marczynski et al., 1964; Hishikawa et al., 1969; Anton-Tay et al., 1971; Lynch et al., 1978b), and possibly in hypnosis as well. Besides melatonin, arginine vasopressin (AVP), and arginine vasotocin (AVT) are the body's endogenous hypothermic hormones (George, 2001). AVT is the ancestral molecule of the mammalian hormones AVP and oxytocin. The presence of both melatonin and AVT in the mammalian pineal gland is well established. Prechel et al. (1983) have demonstrated seasonal variation in the content of AVT in the rat pineal. Pavel (1973) has shown that administration of 3·0% (v/v) melatonin into cats released AVT into the cerebrospinal fluid. That minute amounts of AVT (10^{-21}mol; 10^{-18}g) injected into the third ventricle of the brain in cats could induce slow wave sleep, has been demonstrated by Pavel et al. (1977). Subcutaneous administration of AVT (2 µg; 2 n mol) produced increase in rapid eye movement (REM) sleep in humans (Coculescu et al., 1979). Intranasal administration of AVT (100ng/kg) in prepubertal boys produced spectacular increase in REM sleep (Pavel et al., 1981). These observations indicate the hypometabolic and sleep-inducing actions of melatonin in the brain as separate from the peripheral control mediated by the circulating levels of the hormone. The vasorelaxing action of melatonin on the peripheral vasculature has been demonstrated in the rat (Harlow, 1987). Such action of melatonin has also been demonstrated isolated aorta from rat and rabbit (Satake et al., 1991a,b; Weekley, 1991). The demonstration of the existence of melatonin receptors in the arteries involved in thermoregulation in rats by Viswanathan et al. (1991) is of special significance. Besides the sleep-inducing role, melatonin is hypometabolic and analgesic. The increase in skin resistance observed in yogis during meditation by Wallace and Benson (1972) could be endorphin-mediated.

MIND-BODY MEDICINE

Cousins (1989) dealt with the powers of the mind over body in his book by citing numerous examples. He mentions a case of a woman who was diagnosed with cancer and her doctor gave her four to six months to live. The woman was reported by Cousins to have said, "I looked him straight in the eye and told him to go straight to hell. God could give me four months to live but not another human being". That was six years ago Cousins writes. Of the patients in the Wellness Community under his treatment, Cousins says, "They didn't deny the diagnosis, they denied and defied the verdict that was supposed to go with it. They are able, many of them, to increase their tolerance of chemotherapy. But the important thing is that they are able to summon all their resources for the fight". He cites another case of a patient diagnosed as HIV positive. He put this patient through some mind-body exercises developed by Dr. Green of Menninger Foundation clinic (The exercises essentially consisted of a regimen of meditation and breathing. What is very relevant to the present discourse is that the temperature of the hands increased by 5.5°C or more over the average skin temperature of 24-28°C. This was similar to the increase in temperature of the fingers and toes of meditating yogis which was attributed to the action of melatonin and the increase in the foot temperature in melatonin-implanted pigeons. Three months later the patient was no longer HIV positive. "We have not lost faith, but we have transferred it from God to the medical profession" said George Bernard Shaw. Cousins writes, "The big hope in AIDS is not just that a specific counter-measure may be discovered or devised but that methods may be found for enhancing the components of

the immune system not knocked out by AIDS" (p.78). The immune system is our body's protector from stress and disease. We now know that melatonin is the immune system's greatest ally. It protects the immune system from stress and at the same time boosts the system (see Pierpaoli and Regelson (with Colman), 1995; Reiter and Robinson, 1996).

With regard to cancer treatment, Cousins (1989) says (pp. 86-87), "Chemotherapy is not a magical cure. Its justification is that it contains poisons that can kill cancer cells. The severity of the treatment is undertaken on the theory that the gain is greater than the loss. In calculating the gain represented by the damage done to the cancer cells, the physician also has to take into account the loss represented by the damage caused by chemotherapy to the immune system, the body's own method of combating cancer cells and other diseases. The same is true of radiation, which can damage normal tissue even as it kills cancer cells". Drugs used in chemotherapy are known as spindle poisons. Spindle formation is the initiation of cell division and so these drugs inhibit cell division and cancer growth. Melatonin is also known to intercept spindle formation and thus "it may prove to be another important weapon in our chemotherapy arsenal, but one that does not cause the unpleasant side effects that other chemotherapy drugs do" (Pierpaoli and Regelson, 1995. p.129). So this immune system-boosting drug can prevent cancer. Cousins adds that "the evidence is fast accumulating that if the body is to be treated effectively, the wise physician will pay attention to what goes on in the mind (p.261). The major advances in modern medical science give substance to the principle that the mind of the patient creates the ambience of treatment. Belief becomes biology. The head comes first" (p.281). In this regard, studies have shown that it is possible to enhance healthy living through meditation, visual imagery, having sound religious faith, also having supportive family and friends (Meares, 1982). Positive thinking does go a long way in having "*mens sana in corpore sano*", a rational mind in a healthy body. The emerging science of positive psychology is exploring the benefits of positive thinking (Fredrickson, 2003).

EAST IS EAST AND WEST IS WEST

"Oh, East is East and West is West, and never the twain shall meet", wrote Kipling (1982), the India-born English writer in *Barrack-Room Ballards*, suggesting that there is a barrier that is uncrossable between peoples of different cultures. In his times this was obvious, because East meant, mass poverty, superstition and antiquity. West meant modernity and progress, scientific rationalism and wealth. Geographically, West was Europe and America, and East meant the rest of the world.

From the East, about 500 or 600 years B.C., emerged great thinkers, Buddha and Mahavira in India, Confucius and Lao-Tse in China and Zoroaster in Persia followed by Christ in Palestine. In modern times came Gandhi who to Winston Churchill was just a "half-naked fakir". Less known outside of India are Sankaracharya who traveled on foot throughout India in the 8th century A.D. on his mission to reform Hinduism but he was considered a Buddhist in disguise by the Hindu hierarchy; and the Ezhava sage Sree Narayana Guru whose message was: "*Manushyanu: oru jathi, oru matham, oru dhaivam*" in Malayalam which means; "for man: one race, one religion, one God". The reason for mentioning these two names among the several reformists of Hinduism, is that both these illustrious men hailed from Kerala, one of the smallest states in India carved out by combining two former native states of Travancore and Cochin together with a portion of the former part of British India known as Malabar, where the state language is Malayalam

(the only language in the world that is palindrome). In Kerala, literacy is 100% whereas in the rest of India, half the adult population and two-thirds of women are unable to read or write; and nearly half of the rural girls between the ages of twelve and fourteen do not attend school even for a single day in their life time (see Dréze and Sen, 1996). Kerala is the only state in India where the population has been held under control without coercion or forced sterilization. This has been attributed to high female literacy. Kerala is also a state where women out-number men, 1040 women for every 1000 men as opposed to 929 women per 1000 men in the rest of India. Female life expectancy exceeds that of men in Kerala. The low life expectancy in women in the rest of the country is also a reflection of the neglect of female children. Out of 13,400 abortions carried out at a Delhi clinic in 1992-1993, 13,398 were of female fetuses (Tharoor, 1997). In Travancore, popular education was organized in 1801, whereas it was started in England only in 1870 (see Nehru, 1951). Kerala has traditionally been exposed to external influences – Arab, Roman, Chinese, British, Islamist, Christian, Marxist. Kerala was one place that gave refuge to Jews fleeing persecution in Babylon 600 years before Christ and Jews fleeing Roman persecution in 68 A.D. (Tharoor, 1997). Kerala today is a microcosm of the evolving East, where Hindus, Christians, Muslims and others have lived together in peace and harmony for centuries.

Getting back to Kipling's dictum about East and West; the West has shown the East the way to good life, to material wealth and happiness thereof and the *modus operandi* to achieve all these. Most importantly, to acquire the power and to subdue and control everything that comes in the way of achieving your dreams. The gunpowder might have been invented in the East (China) but they did not want to know to what other uses it could be put other than to use it in firework displays on ceremonial occasions. Mao Zedong is reported to have said, "Power comes from the barrel of the gun". The power to subdue was well demonstrated when atomic bombs were dropped on Hiroshima and Nagasaki. At the session of the Indian Science Congress in Pune, India in 1951, the American delegate spoke at length on the rationale for dropping the atom bomb by a Christian nation. P.C. Mahalanobis, the eminent Indian statistician, the president of the session, in his concluding remarks said, to the effect that whatever be the rationale for using the atom bomb, history will record that the first time the bomb was used, was on Asian soil. So what has been the outcome? East goes West.

India, the land of Buddha and Gandhi has become a nuclear power and has joined the wild club. The Indian writer Arundhati Roy laments "The nuclear bomb is the most anti-democratic, anti-national, antihuman, outright evil thing that man has ever made. If you are religious, then remember that this bomb is Man's challenge to God. It is worded quite simply : *We have the power to destroy everything that you have created.* If you are not (religious), then look at it this way. This world of ours is 4,600 million years old. It could end in an afternoon". Commenting on the program of building huge dams with the financial aid of the World Bank, displacing from their homes thousands of poor people, she comments, "The international Dam Industry is worth $ 20 billion a year. If you follow the trails of Big Dams the world over, wherever you go – China, Japan, Malaysia, Thailand, Brazil, Guatemala – you'll rub up against the same story, encounter the same actors: the Iron Triangle -". "Big Dams haven't really lived upto their role as the monuments of Modern Civilization, emblems of Man's ascendancy over Nature - the dam industry is in trouble and out of work. So it is exported to the third world in the name of Development Aid, along with their other waste, like old weapons, superannuated aircraft carriers and banned pesticides".

An impartial, non-aligned and vigilant world forum is the only hope for the future of mankind. The predecessor of the United Nations, The League of Nations failed because of its inherent weakness and it came to be called the League of Notions. Today the United Nations is being threatened with the same fate as that of the League of Nations. This world body has already been labeled "irrelevant".

The future looks bleak but we cannot lose hope. Mankind has gone through numerous trials of conscience, has faced mass massacres and unimaginable brutality in the struggle of the weak against the mighty. But the human spirit has prevailed. Kipling's words, "'never the twain shall meet" is what is most commonly known. His subsequent line is seldom mentioned: "But there is neither East nor West, border, nor breed, nor birth/when two strong men stand face to face, though they may come from the ends of the earth". "Strength" like beauty, is in the eye of the beholder. What brought East and West together in the recent times was a frail little woman, Mother Teresa who drew large numbers of Indian legions of volunteers and nuns to work amongst the poorest of the poor in the slums of Calcutta and gave them dignity that society had denied them. Good wine needs no bush.

Let the voices of the two "strong men"
fill the air –
"*Buddham saranam gacchami*"
(Buddha is my Refuge).
"The Lord is my shepherd, I shall not want.
(Psalm # 23).

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